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ABSTRACT

This quasi-experimental study used the two group pretest/posttest design to investigate the comparison of the acquisition of mathematics skills between General Mathematics students and Applied Mathematics 1 students. In the 1994-1995 and the 1995-1996 school years the Generalizable Mathematics Skills Assessment was administered to General Mathematics and Applied Mathematics 1 students as both the pretest and posttest to measure the gain in generalizable mathematics skills. During the study, 151 subjects were tested in three rural Oklahoma comprehensive secondary schools to provide data for the study. The research question was, are there significant differences in the gains in the total mathematics scores, in the calculation of whole numbers, fractions, decimals, percentages, mixed operations, measurements, or in the estimation of mathematics answers between the students who completed General Mathematics and the students who completed Applied Mathematics 1 as measured by the Generalizable Mathematics Skills Assessment instrument? (Author)

A Comparison of the Effectiveness of Applied and Traditional Mathematics Curriculum

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Presented at the Annual Meeting of the
Mid-south Educational Research Association

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This quasi-experimental study used the two group pretest/posttest design to investigate the comparison of the acquisition of mathematic skills between General Mathematics students and Applied Mathematics 1 students. In the 1994-1995 and the 1995-1996 school years the Generalizable Mathematics Skills Assessment was administered to General Mathematics and Applied Mathematics 1 students as both the pretest and posttest to measure the gain in generalizable mathematics skills. During the study, 151 subjects were tested in three rural Oklahoma comprehensive secondary schools to provide data for the study. The research question was, are there significant differences in the gains in the total mathematics scores, in the calculation of whole numbers, fractions, decimals, percentages, mixed operations, measurements, or in the estimation of mathematics answers between the students who completed General Mathematics and the students who completed Applied Mathematics 1 as measured by the Generalizable Mathematics Skills Assessment instrument?

INTRODUCTION

The focus of this research was to ascertain if there was a significant difference in the gain scores of mathematic achievement (dependent variable) between completers of secondary General Mathematics and Applied Mathematics 1 (independent variable) as assessed by the *Generalizable Mathematics Skills Assessment*. Using contextual learning theory, Hull (1993) and Bottoms, Presson, and Johnson (1992) called for the substitution of General Mathematics by curriculum such as Applied Mathematics 1. However, the review of the literature revealed no empirical research to support this suggestion.

STATEMENT OF THE PROBLEM

When evaluating general and applied mathematics courses, there is a lack of data-based research for educators to use for secondary mathematics curriculum decisions.

RESEARCH DESIGN

To investigate the comparison of mathematic skills growth by students in Applied Mathematics 1 and General Mathematics, this quasi-experimental study used a two-group design with cluster sampling.

The research question that directed the study was:

As measured by the *Generalizable Mathematics Skills Assessment,* are there statistically different gains in the total mathematics scores, in the calculation of whole numbers, fractions, decimals, percentages, mixed operations, measurements, or in the estimation of mathematics answers between the students who finished General Mathematics and the students who finished Applied Mathematics 1?

METHODOLOGY

The *Generalizable Mathematics Skills Assessment* developed by James Greenan for the Illinois State Board of Education, Department of Adult, Vocational and Technical Education was utilized to collect the data for the study as both the pretest and posttest. Included in the test were sections in the calculation of whole numbers, fractions, decimals, percentages, mixed operations, measurements, and estimation. Three rural Oklahoma comprehensive high schools served as the testing sites for the study, of which two schools participated in both years of the study and one school took part in the first year of the study. This yielded five rounds of testing and 127 sets of pretests and posttests matched by participant. The pretests were administered at the beginning of the school years and the posttests were given at the end of the school years.

RESULTS OF THE STUDY

The results of the study are summarized in the following findings:

1. Applied Mathematics 1 students achieved statistically higher gain scores when compared to the General Mathematics students for the cumulative total and the whole numbers, fractions, decimals, mixed operations, measurement, and estimation sections of the *Generalizable Mathematics Skills Assessment*.

2. There was no significant difference in the gain scores between the Applied Mathematics 1 and General Mathematics students in the percentages section of the instrument.

3. There were significant differences between the pretest and posttest Applied Mathematics 1 students' mean scores for the cumulative total and the decimal and the percentages sections of the instrument.

4. There were no significant differences between the pretest and posttest Applied Mathematics 1 students' mean scores for the whole number, fraction, mixed operations, measurement, and estimation sections of the instrument.

5. There were significant differences between the pretest and posttest General Mathematics students' mean scores for the cumulative total and the decimal, mixed operations, and measurement sections of the instrument.

6. There were no significant differences between the pretest and posttest General Mathematics students' mean scores for the whole numbers, fractions, percentages, and estimation sections of the instrument.

7. The students' final grades in both Applied Mathematics 1 and General Mathematics did not indicate substantial amounts of learning in mathematics took place

at either site or in either curriculum.

8. The post-hoc analysis (R^2) of the Analysis of Covariance of Applied Mathematics 1 and General Mathematics gain scores produced large estimates of relative treatment magnitude for the total instrument and the whole numbers, fractions, decimals, mixed operations, and measurement and calculation categories.

9. The post-hoc analysis (R^2) of the Analysis of Covariance of Applied Mathematics 1 and General Mathematics gain scores yielded a medium estimate of relative treatment magnitude for the estimation section.

10. The post-hoc analysis (R^2) of the Analysis of Covariance of Applied Mathematics 1 and General Mathematics gain scores generated a small estimate of relative treatment magnitude for the percent section.

11. The post-hoc analysis (R^2) of the Analysis of Variance of Applied Mathematics 1 pretest and posttest scores yielded a small estimate of relative treatment magnitude for the fractions, decimals, percent, mixed operations, measurement and calculation, and estimation categories and the total instrument.

12. The post-hoc analysis (R^2) of the Analysis of Variance of Applied Mathematics 1 pretest and posttest scores generated a negligible estimate of relative treatment magnitude for the whole numbers category.

13. The post-hoc analysis (R^2) of the Analysis of Variance of General Mathematics pretest and posttest scores generated a medium estimate of relative treatment magnitude in the percent category.

14. The post-hoc analysis (R^2) of the Analysis of Variance of General Mathematics pretest and posttest scores produced a small estimate of relative

treatment magnitude for the total instrument and the fractions, decimals, mixed operations, and the measurement and calculation categories.

15. The post-hoc analysis (R^2) of the Analysis of Variance of General Mathematics pretest and posttest scores tendered a negligible estimate of relative treatment magnitude for the whole numbers and estimation categories.

CONCLUSIONS

In light of the mixed results from the ANCOVA, the within groups ANOVAs, and the post-hoc analyses, neither of the two mathematics curricula had a noticeable impact upon the student's test scores.

Based on the findings, this researcher derived the following conclusions:

1. The contextual approach used in Applied Mathematics 1 is as effective, or possibly more effective than the traditional teaching methodology used in General Mathematics.

2. Due to the statistically equivalent or superior scores by the Applied Mathematics 1 students, Applied Mathematics 1 may be substituted for General Mathematics without a loss of learning.

IMPLICATIONS

In the course of the investigation this researcher was informed by a number of state and local education agencies of the replacement of General Mathematics by Applied Mathematics 1. While there were many individuals who believed this is an educationally sound decision, this research should be viewed as a preliminary study which indicates there is some empirical evidence to support a change from General Mathematics to Applied Mathematics 1.

The educational community needs to continue to develop procedural standards for the evaluation and replacement of theory-based curricula with contextual-based curricula. Until this step is taken, educators will continue to be accused of a "flavor-of-the-month" mentality toward curriculum reform.

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